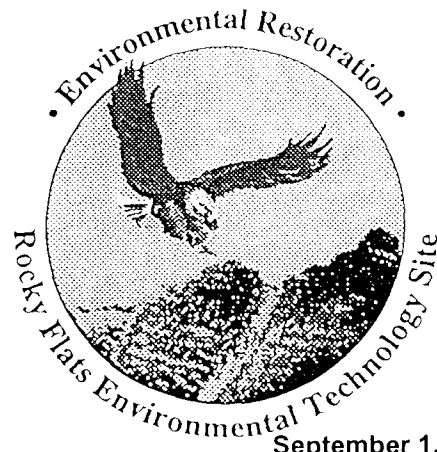




CANBERRA IN SITU SERVICES

ISOCS GAMMA SPECTROSCOPY ROUTINE OPERATIONS

RF/RMRS-98-268



September 1, 1998
Revision 0

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**CANBERRA IN SITU SERVICES
ISOCS GAMMA SPECTROSCOPY
ROUTINE OPERATIONS**

Rocky Mountain Remediation Services, L.L.C.

**September 1, 1998
Revision 0**

**Document Classification Review Wavier
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ADMINISTRATIVE INFORMATION

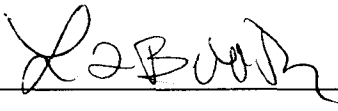
Site: Rocky Flats Environmental Technology Site (RFETS), Golden, Colorado

Project Name: Site Characterization of the 903 Drum Storage Area (IHSS 112),
(IHSS 155), and Americium Zone

Date Prepared: September 1, 1998

Approvals

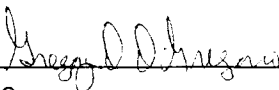
I have read and concur for release of this procedure with respects to the hazards, regulatory requirements and objectives of the project.



Name
Caberra Project Manager

9/3/98

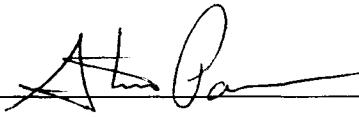
Date



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1.0 PURPOSE

This procedure describes the steps necessary for routine operation of the Canberra In Situ Object Counting System (ISOCS). Instructions are provided for proper equipment set up, sample counting, and reporting of analysis results. ISOCS Gamma Spectroscopy Using the PROcount User Interface is covered in Section 5.

2.0 SCOPE

This procedure applies to all Canberra Industries and/or contract personnel when performing measurements of radionuclide activity of ISOCS geometric objects.

3.0 REFERENCE

- 3.1 S404 InSpector Portable Spectroscopy System User's Manual, S404-USR V2.4 2/97, Canberra Industries.
- 3.2 S473 ISOCS Calibration Software User's Manual, S473-USR, V1.2b 12/97, Canberra Industries.
- 3.3 ISOCS Gamma Spectroscopy System Input Parameters Procedures, RF/RMRS-98-262.
- 3.4 ISOCS Verification and Validation Measurements Document, D903-001.

4.0 INITIAL SYSTEM SET UP

- 4.1 Prerequisites
 - 4.1.1 Determine & stake the grid in accordance with Statement of Work for the determination of Radionuclides by In Situ Gamma Spectroscopy or SAP.
 - 4.1.2 Move all necessary ISOCS system hardware to the desired measurement location previously identified utilizing a Global Positioning System (GPS) unit, including the detector, laptop computer, InSpector MCA, connecting cables, ISOXSHLD Shield components, battery, and RMRS-supplied vehicle.
 - 4.1.3 Provide adequate battery power for the InSpector and computer. To maximize operating time in the field, ensure that all available batteries are fully charged before moving to remote measurement locations.
 - 4.1.4 Adjust shielding to allow for a 12 meter diameter circular plane as described in ISOCS Gamma Spectroscopy System Input Parameter Procedure RF/RMRS-98-262.

4.2 ACQUISITION CONSIDERATIONS

- 4.2.1 When the detector has been securely mounted and aimed at the desired measurement point, spectral data can be acquired. This can be performed most efficiently by using the Sample Counting menu option within the PROcount software. Use of this option allows spectra to be acquired, identified, stored and analyzed in an automated sequence.
- 4.2.2 Since spectral data will be acquired before the ISOCS efficiency calculation is performed, the soil counting data must be stored for subsequent analysis with an appropriate ISOCS soil efficiency template file. These files will be transferred via Iomega Zip Drive to the computer with which the ISOCS efficiency calculation will be performed.

4.3 QUALITY CONTROL OPERATIONS

Prior to routine sample counting, perform all necessary quality control operations detailed in SOW, SAP & In Situ Services Quality Assurance Project Plan or QAPjP.

5.0 ISOCS and PROcount

Field measurements will be made using a template soil geometry with appropriate template values for ambient temperature, atmospheric pressure, soil density, humidity of ambient air, and distance from detector to target soil. This section assumes that the user is already familiar with the PROcount application, and that an appropriate Multichannel Analyzer (MCA) Input named DET01 has been defined. Detailed instructions for proper use of PROcount are provided in the InSpector Spectroscopy System Basic Operations manual. The user should refer to that document whenever necessary to supplement the information provided in this section of the procedure.

5.1 Starting PROcount

- 5.1.1 Apply power to the InSpector and laptop computer.
- 5.1.2 Access the desktop screen and double click on the Genie2000 icon. This will open the Genie2000 folder and display a GENIE2000 Icon View window or a GENIE2000 Details View window.
- 5.1.3 Double click on the PROcount icon. This will display a System Logon dialog box.
- 5.1.4 If the factory default security is still in effect, enter manager in the User name field of the System Logon dialog box, and then click on the OK button. If alternate user accounts have been created using the Password

File Editor, enter the appropriate
ensure successful logon.

User name and Password to

- 5.1.5 An MCA Viewing Control Window (MVC window) will then be opened at the bottom of the screen, and the GENIE PROcount Main Selection Screen menu will be displayed at the top of the screen.

5.2 GEOMETRY AND SAMPLE TYPE DEFINITIONS FOR ISOCS

Proper setup of PROcount requires creation of Geometry and Sample Type definitions, which are appropriate for the type(s) of measurements to be performed. The geometry of all field measurements will be the same -- a 12 meter diameter circular plane of soil with the detector positioned one (1) meter above the surface. Sample Types will include:

- Field Control Measurement Type
- Background Type
- Duplicate Type
- Calibration Check Type
- Normal Sample Count Type

5.2.1 Select System Maintenance from the Main menu. This will display the System Maintenance menu.

5.2.2 Select Editors to display the Editors menu.

5.2.3 Select Geometry Name Editor

5.2.4 Select "Plane Source".

5.2.5 Use the OK button to exit the Geometry Name Editor dialog box.

5.2.6 When the Editors menu is redisplayed, select Sample Type File Editor.

5.2.7 Using this editor create and edit a Sample Type file named ISOCS.

5.2.8 A dialog box will be displayed. The editable fields in this dialog box are used to control the operation of the Sample Counting menu option whenever this Sample Type is selected.

5.2.8.1 The Analysis Sequence File field specifies the default Analysis Sequence that will be executed during the Sample Counting operation. The "Perform No Analysis" entry in this field indicates that no analysis will be performed immediately

after the acquired spectral data is saved in a CAM file. This option is appropriate for the ISOCS measurements to be performed in this procedure, since final ISOCS analysis will not be performed in the field.

5.2.8.2. The Sample Type File Editor will show a value of 900 seconds in the Live Time field. This value will be used as the default preset live time for the Sample Counting operation whenever this Sample Type is selected.

5.2.9 When editing of the ISOCS sample type file is complete, use the OK button to exit the Sample Type File Editor dialog box.

5.3 SETTING THE OPERATING DEFAULTS

5.3.1 Return to the System Maintenance menu, then select the PROcount Setup option. This will display the Genie PROcount Setup dialog box.

5.3.2 Click on OK button to exit the Genie PROcount Setup dialog box.

5.4 APPLYING HIGH VOLTAGE TO THE DETECTOR

Prior to acquiring new spectral data, high voltage must be applied to the detector. This function can be performed using one of two methods. First:

Caution: Confirm that the detector has been properly cooled with liquid nitrogen before performing these steps. Applying high voltage to a detector that has not been properly cooled will result in damage to the detector and will require that it be returned to the factory for servicing.

5.4.1 Using Detector Management

5.4.1.1 Select Detector Management from the Main menu.

5.4.1.2 Select the desired detector from the Choose Detector section of the next dialog box; click on the Hardware Control button.

5.4.1.3 Select High Voltage - On/Off/Reset from the Hardware Control menu.

5.4.1.4 Select On from the High Voltage Control dialog box. The HV indicator light on the InSpector front panel will be illuminated and after a brief delay, the Hardware Control menu will be redisplayed.

5.5 ROUTINE SAMPLE COUNTING

In preparation for ISOCS measurements of the 12 meter diameter circular areas of soil to be analyzed in this procedure, all InSpecor system hardware must be properly set up at the selected measurement location, with the detector placed one (1) meter distance from the soil being assayed. The tasks of acquiring, identifying and saving spectral data can then be performed by:

- 5.5.1 Select the Sample Counting option from the Main menu.
- 5.5.2 As described earlier, a special Sample Type named "ISOCS Sample" should be defined and saved with the file name ISOCS.STF. This is the only Sample Type which has been defined, so it will be selected automatically at the start of the Sample Counting operation.
- 5.5.3 Click the OK button to exit this dialog box.
- 5.5.4 Acquisition of spectral data will be started at this point. The spectrum can be viewed in the Multichannel Analyzer Viewing Control Window (MVC window) at the bottom of the screen. The message "Please wait while sample parameters screen is prepared" will be displayed briefly followed by the Sample Counting | Sample Parameters dialog box.
- 5.5.5 Enter appropriate text in the Sample ID and Description fields.
- 5.5.6 A value of one should normally be entered for Sample Quantity.
- 5.5.7 The default entries in the Sample Units and Sample Date fields should normally be left unchanged.
- 5.5.8 To allow normal termination of the Sample Counting operation, use the OK button after parameter entry is completed.
- 5.5.9 The Main menu will be redisplayed and data acquisition will continue until the preset live time has elapsed.
- 5.5.10 When the acquisition stops, a CAM file will be saved in the PROCOUNT\CAMFILES\ISOCS directory. The name of the CAM file will be STCnnnnn.CNF, where STC is the Sample Type Code and nnnnn is an integer incremented by one for each successive count. Record this code in your logbook.

The Sample Counting operation can be repeated at this time, if desired. For each count, sufficient information must be obtained about the object being assayed to allow proper ISOCS efficiency calculations.

5.6 ANALYZING QC MEASUREMENTS IN THE FIELD

After normal termination of the Sample Counting operation, analyze and review the resulting CAM files from Quality Control counts (Background Counts, Source Check Counts, and Field Control Measurements, and Duplicate Counts) using the additional PROcount menu options in accordance with the QAPjP (D903-003).

- 5.6.1 Return to the System Maintenance menu.
- 5.6.2 Select Editors QA.
- 5.6.3 Select appropriate file (e.g., Background Counts, Source Check, etc.) and produce the last measurement report to verify that the controls are within specifications. If there is a failure, repeat the measurement. Before routine sample counting measurements can commence, all QC requirements must be met in accordance with the QAPjP (D903-003). If two consecutive failures occur, fill out a Non-Conformance Report.
- 5.6.4 If more than one Sample Type is listed in this dialog box, highlight the one used for ISOCS measurements (e.g., ISOCS Sample), then click on the Choose by Sample Type button.
- 5.6.5 The next dialog box will list all files stored in the PROCOUNT\CAMFILES\ISOCS directory. Highlight the desired file in this list, then use the Select button to select that file and exit the dialog box.

5.7 Exiting PROcount

When all sample counting is completed and additional use of the detector is not required, high voltage should be turned off before disconnecting the power cables. Turning off the high voltage is as follows:

- 5.7.1 Select Detector Management from the Main menu.
- 5.7.2 Select the desired detector from the Choose Detector section of the next dialog box.
- 5.7.3 Click on the Hardware Control button.
- 5.7.4 Select High Voltage - On/Off/Reset from the Hardware Control menu.
- 5.7.5 Select Off from the High Voltage Control dialog box.

When all CAM file analyses are completed and no other PROcount operations are required, return to the Main menu and click on the Exit button. This will exit the PROcount application and redisplay the desktop screen.